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THE DISTRIBUTION OF FINANCIAL RESULTS BETWEEN FARMERS DURING A PERIOD OF AGRICULTURAL SETBACKS: GRAIN FARMERS IN THE WESTERN TRANSVAAL, 1981/82*

by B.D.T. JANSE VAN RENSBURG and J.A. GROENEWALD**

ABSTRACT

The first half of the 1980s was a period of economic setbacks. Ratio numbers were used to measure financial success in the Western Transvaal. Median profitability was low, but solubility favourable. Excessive use of short-term debt capital was encountered. The median ratio between gross revenue and total costs was unfavourable; over-expenditure on fertilisers, fuel and repairs in particular, reduced profitability. Large variances were encountered in most ratios and distributions were not normal. Those whose performances were weaker in terms of profitability and liquidity incurred larger costs relative to revenue and also invested more.

INTRODUCTION

The eighties opened with a period of apparent prosperity for South African agriculture. The years 1979/80 and/or 1980/81 were characterised by record crops of maize, sunflower, dry beans, buckwheat, peanuts, cotton, sorghum, cowpeas and dried peas. Wheat production reached two successive records in 1981 and 1982. Drought subsequently set in and production levels declined. In both years 1982/83 and 1983/84 the total maize crop was less than 30 per cent of the record level of 1980/81 (*Abstract of Agricultural Statistics*, 1986).

The years of drought were accompanied by serious recession and hyper-inflation (stagflation) in South Africa. Prices increased as follows between 1981 and 1984 (*Abstract of Agricultural Statistics*, 1986):

Producer prices of farm products	:	39%
Farming requisites	:	42%
Consumer prices, all items	:	44%
Consumer prices, food	:	38%

The process of deteriorating parity in agriculture in the seventies (Groenewald, 1982) was thus continued. According to Table 1, real values of

TABLE 1 - Gross value of agricultural production and the agricultural sector's expenditure on certain inputs, South Africa, 1980/81 to 1984/85

Item	1980/81	1981/82	1982/83	1983/84	1984/85
Gross value of agricultural production (R mill.)[1]	7 036	7 636	7 823	8 750	10 603
Expenditure on certain inputs (R mill.)[1][2][3]	2 648	3 519	3 448	3 401	3 679
Margin above included, inputs (R mill.)	4 388	4 117	4 375	5 349	6 294
Price index: Farming requisites[1][2] (1975 = 100)	188	213	261	298	337
Consumer prices[1][2] (1975 = 100)	177	204	234	262	293
Margin deflated by:					
Index of farm requisites (R mill.)	4 388	3 873	3 151	3 374	3 863
Consumer price index (R mill.)	4 388	3 807	3 309	3 613	4 183
Gross capital formation: Change in livestock inventory (R mill.)[1]	- 32	+ 75	- 24	- 260	- 167
Farm debt (R mill.)[1][4]	3 839	4 839	5 785	7 409	9 495
Debt, deflated by consumer price index (R mill.)	3 839	4 199	4 376	5 005	5 736

[1] Source of data: Directorate of Agricultural Economic Tendencies 1986, *Abstract of Agricultural Statistics*, Pretoria
[2] 1980 taken as 1980/81, etc.
[3] Packing material, fuel, fertilisers, stock and poultry feed, dips and spray material and gross capital formation in fixed improvements, tractors, machinery and implements.
[4] Amount on December 30

**Department of Agriculture and Water Supply and the University of Pretoria, respectively, April 1986

margins over a group of important inputs were considerably lower for each year in the period 1981/82 to 1984/85 than in 1980/81, livestock inventory values declined and the real value of farm debt increased by almost 50 per cent.

In such a situation, an analysis of farmers' financial situation and its distribution is relevant.

In this article results of such an investigation in Western Transvaal are reported on.

RESEARCH PROCEDURE

Approach

The analysis was done by computing ratios from data collected for the 1981/82 production season from 72 farmers in the Western Transvaal grain area, mainly Agro-economic Region B4 (Union of South Africa, 1951), during a maize production survey by the Directorate of Agricultural Production Economics. In this article a selection of the most relevant ratios so calculated is presented.

Ratios consist of instruments that express certain entities in terms of other entities and thereby transfer simple and readily interpretable information for corrective managerial action (Reynders, 1974). Ratios can be used for financial analysis (financial ratios) (Penson et al., 1982) and efficiency analysis (efficiency ratios) (Harsh et al., 1981).

Financial statements normally form the source documents for ratios (De la Rey, 1981). Ratios have certain limitations which must be borne in mind in their interpretation.

Limitations of ratios

Ratios, being largely based on financial statements, also suffer from the most important limitations of financial statements, which may be summarised as follows (Bernstein, 1974):
(i) They provide only data that can be measured in money terms.
(ii) Simplification through grouping of costs, assets and liabilities under a small number of groupings is an inherent part of the accounting system and detail does get lost at times.
(iii) Financial statements cover a short time relative to the total life of the enterprise.
(iv) They use cost prices, which do not necessarily portray the condition realistically.

The following problems may also arise with respect to data collected during farm management surveys:
(i) Methods of asset valuation may differ.
(ii) Depreciation methods may differ, although a uniform technique is used in management surveys.
(iii) Income tax is not taken into account.
(iv) Certain aspects of the firm's behaviour (especially operational goals) are difficult or impossible to determine. In addition, real profit or loss can be determined only on final liquidation (Lubbe, 1981).

In order to be used meaningfully, ratios must meet certain requirements (Reynders, 1974; Bernstein 1979):
(i) Ratios must be meaningful; the entities used must have a logical relationship to one another.
(ii) Ratios must be relevant and therefore correspond to the purpose for which the ratios are calculated.
(iii) Ratios must be comparable: the numbers obtained from different enterprises in the same industry must be comparable. This requires consistency in methods of calculation.

In the use of ratios, the following limitations must be borne in mind in addition to those already mentioned (Reynders, 1974; Weston and Brigham, 1978):
(i) The activities of firms are often too diverse to form a relatively homogeneous group of firms for purposes of comparison. In this study, the farmers are mainly grain producers and this problem is not of critical importance.
(ii) A ratio which was compiled individually, without a yardstick for comparison, is not of much value. A group of ratios must be considered simultaneously since the number may be related to deviations in other attributes.
(iii) Ratio analysis is based upon the assumption that an income and balance sheet reflects the real situation within the business. The seasonal nature of agriculture may cause balance sheets not to reflect a true picture of the enterprise at the time of compilation of final statements.
(iv) The balance sheet merely provides a quantitative record of assets without indications of qualitative properties or productive capacities.
(v) Ratios merely measure financial efficiency and they therefore exhibit symptoms of possible equidepartures. They do not provide a complete diagnosis.
(vi) Ratios provide only static analyses.
(vii) Differences in production methods, production conditions, valuation methods, record-keeping practices and methods of calculation complicate inter-firm and intra-firm comparisons.
(viii) It is difficult to determine whether a particular ratio is good or bad (De la Rey, 1981).
(ix) Ratios cannot be used in isolation from each other - they must be interpreted together.

Advantages of ratios (De la Rey, 1981)

(i) They aid in the identification of weaknesses and faults in the enterprise.
(ii) They provide a basis for the establishment of goals for management and for measuring real performance against these goals.
(iii) They provide the manager with information which is intelligible and useful.
(iv) Profitability can be used for the evaluation of goals.
(v) Enterprise comparisons indicate differences in performance between different firms.

Classification of ratios

Ratios must be selected and classified according to the purpose of the measurement. There are a multitude of forms of classification in literature (Block and Hirt, 1978; Downey and Trocke, 1981;

Spoelstra, 1981; Lubbe, 1983; Reynders, 1974). The "Du Pont" system, which also indicates the relationship between different ratios, is one of the most useful (Weston and Brigham, 1978). In this study, Reynders' (1974) threefold classification of (1) profitability ratios, (2) ratios concerning continuity and financial leverage and (3) managerial efficiency and operational relationships was utilised. An exposition follows:

Profitability ratios

The following ratios were calculated:

$$\text{Return on total assets:} \quad RO = \frac{\text{Net farm income}}{\text{Total assets}}$$

This measures the combined efficiency of all assets and is independent from method of finance (Van Horne, 1977). A low value indicates low productivity of some assets, over-investment, low turnover, low profit margins and/or over-evaluation (Lubbe, 1981).

$$\text{Return on capital:} \quad RE = \frac{\text{Net profit after deduction of interest}}{\text{Net value}}$$

This ratio measures profitability on own capital after remuneration of loan capital (Petrof *et al.*, 1972). It indicates whether alternative investments could be more profitable. A low value indicates low profit or ineffective use of loan funds (Lubbe, 1981). It also indicates whether loan capital has been used profitably in the enterprise or not.

Activity and turnover ratios

This measures the speed at which the capital employed is released in the form of revenue (Tamari, 1978) and thus the income generating capacity of capital.

$$\text{Speed of turnover of total assets:} \quad K1 = \frac{\text{Gross income}}{\text{Total assets}}$$

$$\text{Net income generation from gross income:} \quad M4 = \frac{\text{Net income}}{\text{Gross income}}$$

A low value points to excessive expenditure in generating revenue.

Measurement of continuity

The continuity of a business refers to its ability to continue activities, to absorb more credit, to offer resistance to disasters and losses and also to comply with annual obligations. Over the short term, it consists of liquidity ratios and in the long term of solvability ratios (Downey and Trocke, 1981).

Only solvability ratios are dealt with in this article. The first is the debt ratio, the optimum value of which is determined by the nature of the business (Nelson *et al.*, 1977):

$$S11 = \frac{\text{Total loan capital}}{\text{Total assets}}$$

The leverage ratio is also important:

$$H = \frac{\text{Total loan capital}}{\text{Own capital}}$$

This ratio indicates the extent to which the enterprise is able to cover its debts from its own assets.

Managerial efficiency and operational relationships

These ratios indicate the way in which capital was obtained and utilised, and indicate the financial implications.

Some of these ratios analyse capital structure. The term over which credit is needed, the cost of credit and its availability are relevant (Lubbe, 1981).

$$S6 = \frac{\text{Long-term loan capital}}{\text{Total loan capital}}$$

$$S8 = \frac{\text{Short-term loan capital}}{\text{Total loan capital}}$$

$$S16 = \frac{\text{Bank overdraught}}{\text{Total loan capital}}$$

The asset structure is important, mainly because it indicates whether overcapitalisation in land and fixed improvements has occurred.

$$BH1 = \frac{\text{Land and fixed improvements}}{\text{Total assets}}$$

Another important factor is that of cost control. Overall cost measurement was done using the following formula:

$$M2 = \frac{\text{Gross income}}{\text{Total costs}}$$

Two specific input-associated measurements are concerned with cost contibutions:

$$A3 = \frac{\text{Cost of fertiliser for maize}}{\text{Total costs}}$$

$$Z8 = \frac{\text{Cost of repairs and fuel}}{\text{Total costs}}$$

The following operational ratios or efficiency measurements were also calculated:

$$B1 = \frac{\text{Net farm income}}{\text{Farm size (hectares)}}$$

$$Z100 = \frac{\text{Investment in machinery and equipment}}{\text{Farm size (hectares)}}$$

$$Z111 = \frac{\text{Investment in land and fixed improvements}}{\text{Farm size (hectares)}}$$

MEASUREMENT OF CENTRAL TRENDS

The usability of the arithmetic mean as the measurement of the central trend depends on the normality of the distribution; if the distribution is skew, the median is a better measurement (Steyn *et al.*, 1984). If the distribution is completely normal, these two measurements are identical. The Kolmogorov-Smirnoff test (Asisi and Azen, 1979)

was used in this study to test data for normality. In the majority of cases the data (p = 0,05) were found not to be normally distributed. The median was therefore used as the norm and the first and third quartiles are also reported. The quartiles were included in order to indicate the distribution of ratios. If the median, for example, appears to be satisfactory, it is important to know whether this is the case even with the lower quarter. Results appear in Table 2.

TABLE 2 - Ratios for Western Transvaal grain farmers, 1981/82

Norm	N*	$\bar{X}$*	S(X)*	Q1*	Me*	Q3*
Profitability (x100)						
RO	72	0,008	0,053	-0,024	0,017	0,039
RE	72	-0,021	0,068	-0,052	-0,010	0,026
Activity ratios						
K 1	72	0,168	0,070	0,116	0,165	0,211
Turnover ratios (x100)						
M 4	72	0,100	0,430	-0,300	0,110	0,200
Solvability ratios						
S 11	69	0,144	0,105	0,064	0,125	0,211
H	69	0,190	0,189	0,068	0,143	0,268
Managerial efficiency and operational ratios						
Capital structure						
S 6	40	0,23	0,26	0,00	0,15	0,38
S 8	63	0,67	0,32	0,49	0,70	1,00
S 16	45	0,22	0,30	0,00	0,10	0,32
Asset structure						
BH 1	72	0,760	0,072	0,710	0,760	0,820
Cost ratios and cost control						
M 2	72	1,02	0,35	0,83	1,10	1,30
A 3	72	0,26	0,10	0,19	0,25	0,33
Z 8	72	0,24	0,07	0,20	0,23	0,29
Operational relationships						
B 1	72	6,3	65,7	-33,1	21,9	46,2
Z 100	72	171,9	91,2	112,9	158,3	221,6
Z 111	72	963	387	658	943	1 120

*N = Number of farmers
$\bar{x}$ = mean value
s(x) = Standard deviation of x
Q1 = first quartile
Me = median
Q3 = third quartile

DISCUSSION OF RESULTS

Profitability

The median profitability of farmers in the region was very low. The lower value for return on own capital (RE) is due to the fact that realised profit margins were smaller than the cost at which loan funds were acquired.

The RO values of at least the lowest quartile (Q1) were negative, as were the RE values of at least half of the farmers (Me). These farmers' chance of survival after more years of drought is probably slight. The standard deviation (S(x)) exceeds the mean ($\bar{x}$) and the median. This indicates a wide distribution.

Low means and medians occurred with respect to activity and turnover ratios. Values obtained for the upper quartile were, however, sound. The standard deviation of M 4 also exceeds the mean and the median.

Measurement of continuity

Solvability (S 11) was found to be favourable, even at the third quartile, which is associated with the heaviest debt burden. The leverage ratio (H) measures the extent to which own capital is taken up by loan funds; this ratio is low. Solvability does not therefore appear to be a crucial problem in the region. Overvaluation of assets may, however, create problems and has probably contributed to the relatively low values. This may create false confidence.

Managerial efficiency and operational ratios

The analysis of capital structure points first to a preponderance of short-term credit relative to total loan funds (S 6; S 8). The figures indicate that in the case of at least one quarter of the farmers involved, all loan funds consisted of short-term credit (See Q 3 of S 8 and Q 1 of S 6). The lower quartile of S 8 shows that with three quarters of the farmers, short-term credit amounted to over 49 per cent of all loan funds. The mean and median values point to a 67 and 70 per cent use of short-term credit, respectively. This may indicate two possibilities, namely large scale financing of long-term requirements with short-term credit and/or a growing inability to pay off short-term debts. Both increase risk considerably and are extremely disadvantageous - particularly in times of rising short-term interest rates. The values given in respect of S 16 indicate, if read together with that of S 8, that bank overdraughts play a relatively modest role. The role of co-operatives is probably predominant.

In the case of by far the majority of the farmers, land and fixed improvements constitute the major part of total assets (BH 1) and this indicates a relatively low level of current assets. This is, however, typical of agriculture. Overvaluation of assets may be important in this regard.

Cost ratios, cost control and operational relationships

The cost ratios are difficult to evaluate because comparable standards are largely lacking. The ratio of gross income over total cost (M 2) is poor in the majority of cases: At the median, total costs are covered, but at the bottom quartile, costs exceed gross income.

Some components of total costs (including

fertiliser, fuel and repairs) are directly under the control of the farmers. According to Z 8 fuel and repairs medially constitute 23 per cent and fertiliser applied to maize medially 25 per cent (A 3) of total cost, respectively. These cost components comprise approximately 50 per cent of total costs. Over-expenditure on or wastage of these inputs can obviously have important negative effects on the financial results of a farming enterprise. The quartile with the lowest value gives a combined component of 39 per cent.

Investment in land and fixed improvements is R943 at the median (Z111) and varies between R658 for the first and R1 120 for the third quartile. If land values were to decline, some of the other ratios would also change. The investment in machinery and equipment per hectare (Z 100) of the upper quartile (R221,6) is almost double that of the first quartile (R112,9).

General

It appears that there is reason for concern where profitability is concerned; the majority of farmers obtained poor results. The position of relatively few farmers is acceptable. The profitability ratio of even the upper quartile is poor. It must, however, be taken in account that many farmers have probably overvalued their assets. True profitability may therefore be somewhat better.

The solvability ratio is acceptable with reservations, but the distribution of the remainder of the ratios gives reason to believe that many farmers will only be able to survive with a drastic improvement in managerial ability. Overvaluation of assets may, however, cause the true solvability situation not to be all that favourable and this, in turn, means that the ability to survive may be even more unfavourable than appears in the analyses.

INTERRELATIONSHIPS BETWEEN RATIOS

It is obviously desirable to try to determine reasons for good or poor results. In order to do this, respondents were first divided according to certain criteria into three equally large class frequencies. Boundaries between the groups are shown in Table 3.

TABLE 3 - Boundary values between frequency groups for certain attributes of farmers in the Western Transvaal, 1981/82

Attribute	Boundary values between	
	Groups 1 + 2	Groups 2 + 3
Return on own capital (RE)	+ 0,014	- 0,034
Leverage (H)	+ 0,095	+0,202
Net farm income per hectare (B 1)	+39	- 7

These groups were tested to determine whether their median or mean values differed significantly from each other. In the case of return on own capital (RE) where the distribution does not differ significantly from a normal distribution a parametric

analysis of variance was done and for the other two attributes which are both significantly skewly distributed the Kriskall-Wallis test (Steyn et al., 1984) was used. In all cases, the differences were statistically highly significant ($p < 0,001$).

Cross-frequency analysis was then done with the aid of the SAS (1982) package. The log linear analysis technique (Steyn *et al.*, 1984) was used to test relationships statistically (Reporting of the full procedure and of all cross-tabulations requires much space and only final results are therefore given here. For a full exposition consult Janse van Rensburg (1985), Chapter 7.) Table 4 shows the results. In this test a null hypothesis assumes absence of relationships. The probabilities as shown in Table 4 indicate the probabilities ("probabilities of excess") that groups may indeed be regarded as being independent. If, for example, a significance level of p = 0,05 is used, a value of 0,05 or more will cause the null hypothesis to be accepted and the conclusion will therefore be drawn that the two attributes are unrelated. Only variables which have shown a significant relationship with one or more of the three test attributes are included in the table.

With respect to return on own capital (RE), farmers who obtained poor results showed the following results compared with better performers:

(i) They obtained a lower gross income per rand spent;

(ii) they spent more on maize fertilisation per rand earned from maize;

(iii) total direct allocable cost was higher per rand of gross income;

(iv) they had a higher investment in machinery and equipment per hectare;

(v) they had invested more per hectare in land and fixed improvements.

It becomes clear that the poorer performers incurred more cost relative to production in the production process. They also made higher investments. This all probably indicates less judicious purchase and investment behaviour.

In respect of net farm income per hectare (B1) investment in land and fixed improvements per hectare did not yield any significant relationship. With this exception, the factors influencing return on own capital exerted a similar type of influence. In addition, the poorer performers also showed the following properties:

(i) Their non-directly allocable costs as a percentage of total costs were higher, which may point to excessive fixed costs and therefore insufficient flexibility; and

(ii) Their non-directly allocable costs to maize were higher per rand of revenue from maize.

Once again these findings appear to indicate ineffective expenditure.

With respect to the leverage ratio (H) which was used to measure solvability no significant relationships could be identified.

TABLE 4 - Probabilities of excess with tests for dependence with log linear analysis

Variable		Return on own capital (RE) Net profit after deduction of interest = Net volume	Net farm income per hectare (B 1)	Leverage ratio (H) = Loan funds Net worth
Gross income / Total costs	(M 2)	$<0,01$ **	$<0,01$ **	0,79
Fertiliser costs to maize / Revenue from maize		$<0,01$ **	$<0,01$ **	0,95
Total costs / Gross income		$<0,01$ **	$<0,01$ **	0,79
Non-directly allocable costs / Total costs		0,37	0,04 *	0,42
Non-directly allocable costs to maize / Revenue from maize		-	$<0,01$ **	0,95
Total non-directly allocable costs / Gross income		$<0,01$ **	$<0,01$ **	0,86
Investment in machinery and equipment / Total area	(Z 100)	0,03 *	0,07 [a]	0,40
Investment in land and fixed improvements / Total area	(Z 111)	0,02 *	0,13	0,54

(a) Significant at $p = 0,10$
* Significant at $p = 0,05$
** Significant at $p = 0,01$

CONCLUSION

The wide distributions encountered in many ratios indicate that in addition to the effect of the recession and serious drought, other factors must also have contributed to the serious financial predicament of many farmers. Even in a year generally characterised by poor results, a certain portion of the farmers - at least one quarter - still obtained viable results. Closer investigation revealed that performances concerning profitability and net income per hectare were indeed influenced by the degree of success in transforming inputs into the production process into sales. There are also indications of over-investment on the part of poorer performers. The excessive level at which short-term credit was employed relative to own funds (see S8) is a particular source of concern. This eventually leads to poor liquidity. The effect of this on cash flow is logically aggravated by rising interest rates. Serious deficiencies in many farmers' financial management were obvious. This aspect has traditionally received far too little attention in agricultural extension. An improvement in knowledge concerning financial management aspects in farming must be accepted as an urgent priority - among farmers and among their advisors.

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